Division of Agricultural Sciences
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TRENDS AND OUTLOOK

California OLIVE INDUSTRY

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THIS IS THE SITUATION

The canned ripe olives consumed in the United States are all from California. Much of the olive oil consumed and certain other products, such as Spanish green olives, however, are imported, largely from the Mediterranean Basin.

Acreage in California expanded rapidly until 1920, thereafter remaining at some 31,000 acres. During the past forty years, yield increased steadily to an average of 1.7 tons maintained since 1945. Annual production increased correspondingly, from 8,200 tons in 1910–14 to 46,000 tons in the past fifteen years.

Olives were originally used chiefly for their oil. During the twentieth century their use in pickled form increased rapidly, and crushing declined from two thirds to one quarter of the crop.

Farm prices reached a high level during the 1940's when war conditions drastically reduced olive oil imports. They declined immediately thereafter to an average of $200 per ton since 1950, compared with $60 for 1930–40.

Marketing controls have been used to improve returns to the industry. At present the major reliance is on advertising to promote sales of canned ripe olives and, to a lesser extent, on a stabilization plan to correlate supply with market demand.

THIS IS THE OUTLOOK

Production is likely to increase in the immediate future, but only to a limited extent. Tree removal is expected to approximate new acreage coming into bearing. Yields somewhat above the present level are indicated—provided the good cultural practices now employed continue.

The present pattern of use is likely to continue, except that the relative importance of crushing might decline still further. A sharp decrease appears unlikely.

Forecasting farm prices is more difficult. The present level probably will be maintained or exceeded—if consumer purchasing power continues to climb at or near the rate of recent years. Prices for canning, crushing, and other processing should continue at present relationships since the proportions of the crop entering the various outlets are not expected to change.

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The olive is firmly established as one of California's important specialty crops. The only other state growing olives commercially is Arizona, with an annual production of merely 100 tons or less. Thus, California dominates the domestic scene, though it produces only 1 per cent of the world crop.

The crop is used primarily for canned ripe olives. Substantial quantities, at much lower prices, are crushed into oil or processed as other products. California supplies all the canned olives consumed domestically and exports a small quantity. Normally, almost all the country's olive oil is imported, as is also a substantial part of certain other products, chiefly Spanish green olives.

Olives were introduced in California about 1800 when the Spanish padres brought olive seeds from Mexico.[1] The resulting variety, named "Mission," is still one of the leading varieties in the state. During the second half of the nineteenth century other varieties were imported from the Mediterranean countries, chiefly for oil production. Soon after the turn of the century, emphasis shifted from oil to the more profitable table varieties.

Important changes have occurred during the past decades, and others are likely to come. This circular examines the factors responsible for such changes and estimates future prospects. It must, however, be limited to olives alone; it cannot widen its scope to include such broad factors as prospective demand (resulting from changing food habits and consumer purchasing power), relative production, and processing costs (for olives and alternative crops), and so on. Yet, by considering past shifts and present

[1] Doubt exists about the date and location of the first California plantings. It has been stated frequently that olive seeds were brought to Mission San Diego in 1769. There appear to be no historical records to support this claim. "All we can prove is that some missions, including San Diego, had begun olive culture by 1803. Mission San Diego produced the first olive oil in California. Other missions no doubt were ready to do the same since their olive harvest was being gathered." So concludes Father Maynard Geiger, an outstanding authority on the mission period, who has found no documentary proof for a contrary view. Surely mission reports would contain some mention, if olives were planted much before 1800.

My statement is based on information sent me by Father Geiger in a letter dated April 20, 1960. I wish to thank Miss Erline Hevel, Secretary, California Olive Association, and Mr. Harold G. Schutt, Lindsay Ripe Olive Company, for calling my attention to the uncertainty about the first California plantings of olives.

trends, intelligent projections for the future can be made of several factors affecting prices paid for olives. Olive growers and processors should consider these indications in their planning.

THE INDUSTRY

The olive's growth requirements confine commercial production in California to a few varieties grown in the central part of the state.

Growing Conditions[2]

The olive is not especially sensitive to climate, moisture, and soil conditions. In establishing a commercial enterprise, however, the grower should give close attention to the following requirements.

Olives produce best in areas with relatively cold winters and warm summers free of fog. Winter chilling is required for proper flower formation, but temperatures below 15°F harm most varieties. Generally, areas above 45° latitude are unsuitable. Olives can be grown nearer to the equator than 30° latitude, but they may not fruit well there.

The rainfall in most areas provides enough moisture for olive trees to live and bear some fruit. A liberal supply of water, however, is required during the growing season to produce larger trees with heavier crops of large and unshriveled fruit. In California practically all commercial orchards use summer irrigation. Rainfall during bloom appears not to decrease fruit set.

Olives grow satisfactorily on a wide range of soil types. Unless trees are planted on well-drained soils free from alkali, however, they show stunted growth, produce a light crop, ripen their fruit prematurely, and die.

Producing Areas

Conditions for olive production are particularly satisfactory in the interior valleys of central California and in the surrounding foothills. Temperatures are suitable. Irrigation is possible and not too expensive. Insect control is less difficult than in the coastal areas. Conditions in southern California and in the coastal area are less suitable for profitable production.

Relative advantages in producing olives profitably in the various parts of the state are reflected in plantings made in former years and more recently. Almost two thirds of the acreage is in Butte, Tehama, and Tulare counties. These

OLIVE PRODUCTION DISTRICTS

Counties for each district are listed in order of present acreage:

South San Joaquin District includes five counties of the southern portion of San Joaquin Valley: Tulare, Fresno, Madera, Kings, and Kern. About 40 per cent of the state's olive acreage is located in these five counties.

North Sacramento District includes five counties in the northern part of Sacramento Valley: Butte, Tehama, Glenn, Shasta, and Yuba. They constitute 38 per cent of the acreage.

Other Areas, representing 22 per cent of the acreage, include all other counties. Twenty of these have no commerical acreage, fifteen have limited plantings of less than 100 acres each, and nine have acreages ranging from 150 to 1,250.

[2] For a more complete discussion see: H. T. Hartmann, *Olive Production in California*. California Agr. Exp. Sta. Manual 7, 59 pp., 1953.

three counties form the nuclei of two major producing areas located in south San Joaquin and north Sacramento valleys. By adding nearby counties with smaller acreages to these production centers, the territory included in the two principal olive-producing districts listed in the box, page 4, is covered. This segregation is arbitrary but convenient in this discussion of major areas of production.

Varieties Produced

Numerous olive varieties are cultivated in other countries. They can be grown successfully, though not always profitably, in California. Many have been imported by the University of California and are being grown in test plots at its Wolfskill Experimental Orchards at Winters, California.

At present, however, 98 per cent of the state's acreage is planted to five varieties. Mission and Manzanillo, the leading varieties, represent three quarters of the total. Next in order are Sevillano, Ascolano, and Barouni.

These varieties differ widely in fruit size, oil content, flesh-pit ratio, ease of handling, maturity dates, tree growth, productiveness, and in other respects (see box). Such differences influence their disposition considerably, and, hence, their profitability. They must be, and are, considered when growers choose varieties to be produced to meet the needs of available markets.

Factors Considered

Bearing acreage changes every year as young trees come into production and

CHARACTERISTICS OF OLIVE VARIETIES

Major differences in physical characteristics, suitability for processing, tree growth, and productiveness among the five major varieties of California olives may be summarized as follows:

Mission is a relatively small-fruited variety with a low flesh-pit ratio. The fruit has a high oil content and is easy to process. It is subject to freezing injury because of late maturity. The trees tend toward alternate bearing. Their tall, upright, and vigorous growth increases pruning and harvesting costs.

Manzanillo is larger and fleshier than Mission. The fruit also has a high oil content and is easy to process. It matures early enough to avoid frost damage. The trees are regular bearers, grow relatively low and spreading, and are easy to harvest.

Sevillano is a large-fruited variety—about three times as heavy as Mission and Manzanillo. Although the fruit has a lower quality and is more difficult to process, a premium price is paid because of its large size. This variety is rarely crushed because of its low oil content and its desirability for canning. Tree size and shape make harvest easy.

Ascolano also has large fruit. The fruit has a high flesh-pit ratio and produces a fine table olive. Its oil content is high but the variety is not crushed often because higher prices are received in the canning outlet. Susceptibility to bruising during harvest and processing is a major obstacle to expanded plantings.

Barouni has large fruit—almost as large as Ascolano. The fruit has a low flesh-pit ratio, is difficult to process, and yields a product of lower quality. The tree is spreading and easy to harvest.

older trees are removed. Differential rates prevail among varieties and districts. As a result, the varietal composition, geographic location, and age distribution of California's olive acreage undergo constant change. These changes affect the longer-run movement of yield. Cultural practices affect yield over the life of the trees as well as for a particular season. But in the short run, yield depends largely on the weather during the blooming, growing, and harvesting season.

These two factors—bearing acreage and yield—ultimately determine production, both for a given season and over the years. With California olives, production is practically synonymous with sales since almost the entire crop is sold. Normally, farm use is limited to 200 tons a year and cullage is not excessive. In 1932, however, almost one quarter of the crop was wasted because of depressed economic conditions.

Generally, 50 to 60 per cent of the crop is canned as ripe olives, 25 to 30 per cent is crushed into oil, 15 to 20 per cent is processed as other products, and 1 to 2 per cent is shipped fresh. The relative demand for olives in these outlets depends on the combined influence of many factors. Each product has its own consumer appeal. Year-end stocks (in the hands of processors and distributors) vary from season to season. Imports of olive oil and some other products, chiefly from Spain and Italy, are substantial. The industry's marketing control program affects canning directly, and other uses, particularly crushing, indirectly.

Figure 1 shows the major relationships among these factors. The bars in the central portion of the diagram are drawn so that their widths are proportional to 1950–58 average disposition.

The discussion in this circular is directed toward an understanding of the interrelationships among these factors. Other influences, though omitted here for convenience, are important and must be considered in arriving at final conclusions.

ACREAGE AFFECTS PRODUCTION

Though the industry had already grown to its present size by 1920 important changes in olive acreage have occurred since then. These were primarily shifts in tree age and in the relative importance of varieties and producing areas.

Past Acreage Trends

In 1910 California had 958,000 olive trees, including 836,000 of bearing age. By 1920 the total had increased to 1.6 million, on 31,000 acres. Acreage has remained at about this level during the past forty years. Actually, it declined to an average of 28,500 in 1933–42 and in 1945 returned to the 1920 level, where it has remained.

Bearing acreage expanded rapidly during the first quarter of the twentieth century, reaching a peak (28,800) in 1927. Subsequent changes have been minor. In 1930–53 bearing acreage varied between 27,000 and 27,800. But this "low plateau" was only 5 per cent below the 1927 peak. Since 1954 a slight increase occurred, bringing bearing acreage to a new peak of 29,000.

Nonbearing acreage fluctuated much more sharply. For twenty years it declined steadily, from 9,200 acres in 1919 to an average of 825 for 1936–39, then it expanded to 5,200 during the 1940's and decreased sharply to 3,100 in 1953–58.

By Districts

Although bearing acreage has continued at an average of about 28,000 acres since the late 1920's, its geographic composition changed. This shift is shown in figure 2. The proportions of the state's bearing acreage in the two major pro-

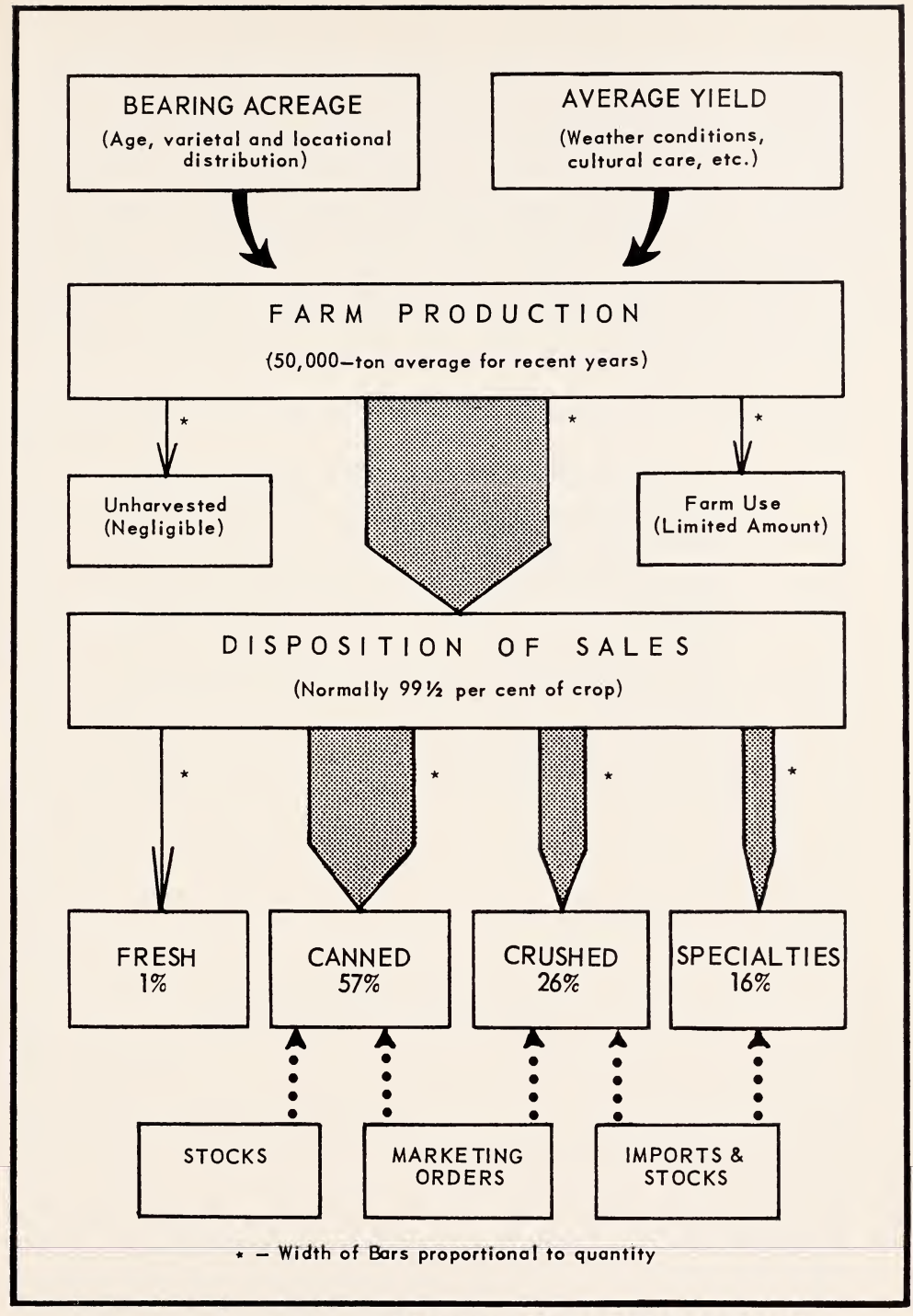

FIGURE 1. MAJOR FACTORS AFFECTING USE OF CALIFORNIA OLIVES.

ducing areas increased substantially—from 20 to 38 per cent for North Sacramento and from 31 to 38 per cent for South San Joaquin during 1921–56. A corresponding reduction occurred in other counties—from 49 to 24 per cent.

Acreage in each district is concentrated within a few principal counties. About 82 per cent of the South San Joaquin District acreage is in Tulare; 9 per cent in Fresno; and 9 per cent in Madera, Kings, and Kern. The county distribution of acreage in North Sacramento District is: 44 per cent in Butte, 36 per cent in Tehama, and 20 per cent divided almost equally among the other three counties.

The acreage in "Other Areas" is divided equally between north and south of the Tehachapi Mountains. About 35 per cent of this "outside" acreage lies in Riverside and Sacramento counties; 29 per cent in San Diego, Los Angeles, and San Bernardino counties; 15 per cent in Yolo, San Joaquin, and Stanislaus counties; and 21 per cent in other counties.

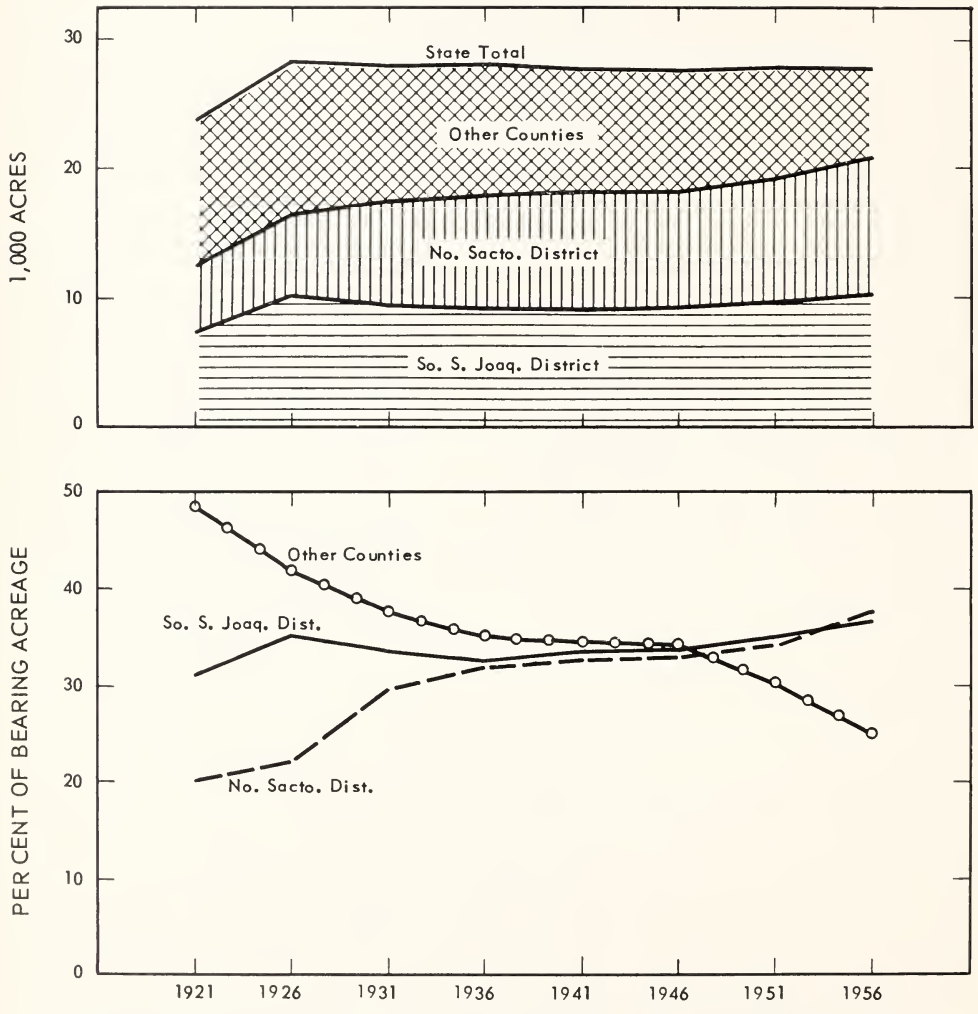

FIGURE 2. California Olives: Distribution of Bearing Acreage, by Major Districts, 1921–56.

Table 1. Bearing acreage of California olives, 1936, 1956, and 1959*

Variety	State total			No. Sacramento		So. San Joaquin		Other areas	
	1936	1956	1959	1936	1956	1936	1956	1936	1956
Mission	14,350	11,640	11,084	5,410	5,690	3,260	1,780	5,680	4,170
Manzanillo	5,930	8,960	9,746	590	710	3,770	6,660	1,570	1,590
Sevillano	2,930	4,520	5,632	2,230	3,560	380	850	320	110
Ascolano	990	770	786	140	60	540	540	310	170
Barouni	500	270	318	220	200	100	20	180	50
Others	3,000	1,540	605	240	290	950	550	1,810	700
Total	27,700	27,700	28,171	8,830	10,510	9,000	10,400	9,870	6,790

* Acreage data for 1936 were revised in 1956 and 1959 by the California Crop and Livestock Reporting Board. The figures shown here are unrevised data by varieties adjusted uniformly to reflect revisions in county totals.

By Varieties

Olive acreage also changed in varietal composition. Between 1936 and 1959 bearing acreage increased about 90 per cent for Manzanillo and for Sevillano. It declined over a third for other varieties: 20 per cent for Ascolano; 33 per cent for Mission and Barouni; and 80 per cent for minor varieties. This shift is accomplished in two ways: by top-working present acreage and by removing trees of unwanted varieties and planting groves of desired varieties.

As a result, the relative importance of varieties has shifted since 1936. Manzanillo increased from 21 to 39 per cent of the total acreage, and Sevillano from 11 to 20 per cent. On the other hand, Mission declined from 52 to 35 per cent and other varieties from 16 to 6 per cent. A detailed comparison on a district basis, for the period 1936–56 is summarized in table 1.

Age Distribution

Olive trees begin to bear during their fourth or fifth year, but harvest is not substantial until their seventh or eighth year. Full yield begins at about age twenty. With proper care, the productive life of olive trees is a hundred years or more. In 1958 two thirds (68 per cent) of the acreage was of trees planted in 1939 or earlier, 22 per cent of younger bearing trees, and 10 per cent of nonbearing trees.

Possibly the most noticeable change in the age composition of olive trees over the years is the shift in nonbearing acreage. The proportion of the acreage consisting of nonbearing trees declined steadily between 1919–21 and 1936–39 —from 28 to 3 per cent of the total. Nonbearing acreage reached a post-depression peak of 5,200 (16 per cent of the total) in 1948–50, and then declined to 3,150 (10 per cent) for 1956–58.

Figure 3 shows the change in age composition of olive acreage occurring between 1936 and 1956. For this comparison older-bearing trees are seventeen years or older. There are several important differences among the districts:

¶ Nonbearing acreage increased sixfold in the two major producing districts and declined by a third in other areas. Practically all the new plantings are now in North Sacramento and South San Joaquin.

¶ Acreage is much younger in average age in South San Joaquin. The proportion of young trees (bearing and non-

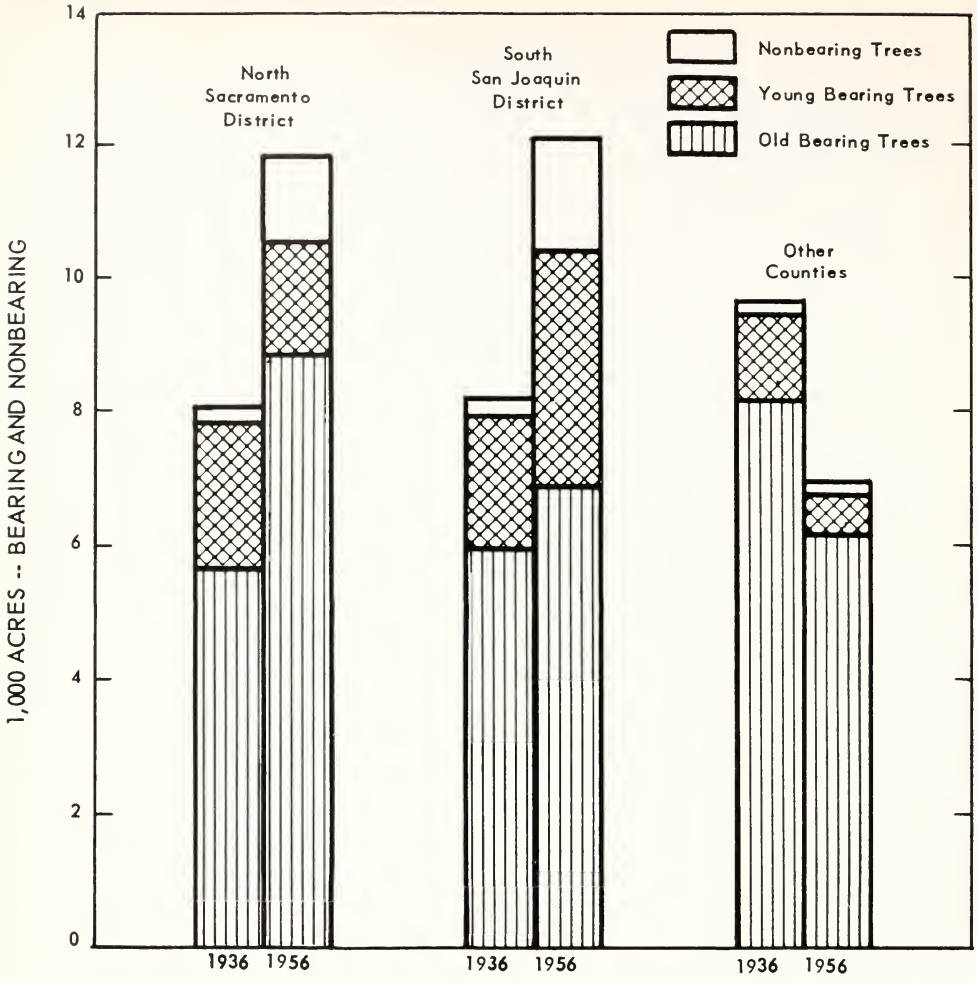

FIGURE 3. California Olives: Age Classification of Acreage, by Districts, 1936 and 1956.

bearing) is 43 per cent compared with 25 and 11 per cent in North Sacramento and in other areas.

¶ The proportion of young trees increased in South San Joaquin (from 27 to 43 per cent) and decreased (from 30 to 25 and 16 to 11 per cent, respectively) for North Sacramento and other areas.

Probable Acreage

It is difficult to estimate bearing acreage very far into the future. For the period immediately ahead, however, a reasonably accurate forecast is possible. Our guides are recent plantings still to come into bearing and probable removals of older or diseased and weakened trees.

Table 2 shows acreage shifted to bearing and acreage removed from production for the period since 1923. About 3,230 acres have been removed every six years during the entire period. If this rate is continued, bearing acreage will increase by 810 acres during 1959–65, since 4,040 acres of presently nonbearing trees will begin to bear. Actually, of course, trees may be removed at a different rate. If the rate is assumed equal to the average for 1947–59, then removals

will be offset exactly by new bearing acreage.

The age distribution of bearing acreage during four years is given in table 3. Unfortunately, acreage is not classified by age for trees older than twenty-three years. Yet, significant differences are evident. In 1958, as in 1953, a larger proportion of the acreage consisted of young trees that had just come into bearing. In addition, the number of older trees at full maturity (nineteen years or more since planting) was reduced from 93 per cent of the bearing acreage in 1943 and 1948 to 76 per cent in 1958. These comparisons suggest that removals may be lighter than usual during the next few years.

Both procedures lead us to the same conclusion: Removals from production during the early 1960's are likely to approximate new acreage coming into bearing. It thus appears that for the next few years bearing acreage will continue at about the current level of 28,000 acres.

YIELD TRENDS UPWARD

Figure 4 shows a substantial increase in average yield during the past forty years—from 0.4 ton per bearing acre in 1920–24 to 1.7 since 1945. Actually, the trend was not uniform throughout this period. A general upward movement prevailed until the late 1930's. During the war years (especially 1940–44) the aver-

Table 2. Changes in bearing acreage of California olives

Period	Bearing acreage				
	Beginning of period	Addition*	Apparent removal		End of period
			Acres†	Per cent‡	
1923–29	25,600	7,660	4,770	18.6	28,490
1929–35	28,490	3,500	4,640	16.3	27,350
1935–41	27,350	1,040	930	3.4	27,460
1941–47	27,460	1,180	980	3.6	27,660
1947–53	27,660	4,870	5,080	18.4	27,450
1953–59	27,450	3,720	3,000	10.9	28,170
1959–65	28,170	4,040	....	....	.....
6-year average	.....	3,716	3,233	11.9	.....

* Trees of nonbearing age at beginning of six-year period.
† Difference between beginning bearing acreage plus "additions" and ending bearing acreage.
‡ Per cent of beginning bearing acreage.

Table 3. Age distribution of California olive bearing acreage

Tree age, years	1943	1948	1953	1958
	Per cent of bearing acreage			
6–13	2.4	2.6	13.9	16.1
14–18	6.8	1.7	2.1	7.9
19–23	90.8	6.5	2.8	76.0
24 and over		89.2	81.2	

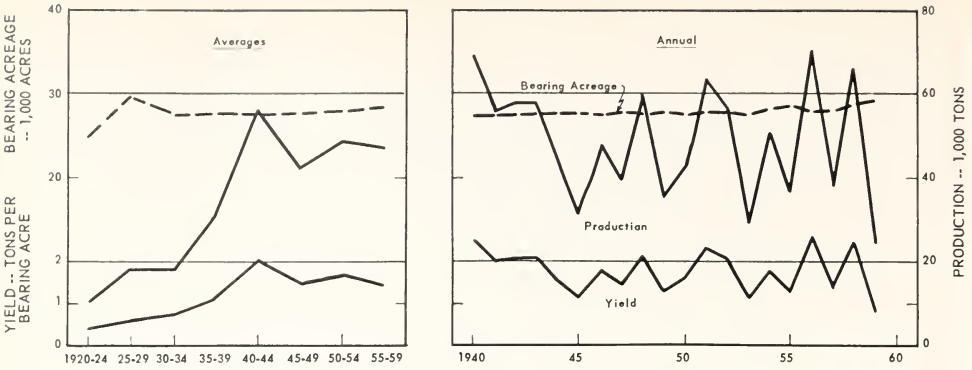

FIGURE 4. California Olives: Production, Bearing Acreage and Yield, 1920–59.

age was high. Probably this was an abnormal result arising from a crop harvested with great care to fill domestic needs when farm prices were high because imports of olive oil were curtailed. Yield continued at 1.7 tons during the post-war period.

Fluctuations in Yield

Yield varies considerably from year to year (see right panel of figure 4). These fluctuations averaged 0.71 ton since 1945, or about 42 per cent of the average yield for the period. The annual change exceeded 1.0 ton in four of the past fourteen years, was 0.5 to 0.9 ton in six years, and fell below 0.5 in only four.

Such wide variations complicate the problem of marketing olives. They result in corresponding annual fluctuations in production and, hence, to a considerable extent, in quantities *available* for canning. But utilization in this outlet is generally changed by a smaller proportion resulting in even greater variations for secondary uses. This, of course, has a direct and important impact upon farm prices.

Comparative Yields

Both production and acreage data have been collected on a varietal basis only since 1940. This information results in the yields summarized in table 4. It is apparent that yields differ substantially among varieties. Yield for Mission is only half that of the other three major varieties. For the minor varieties, yield is still lower.

These data represent the yield for all bearing acreage and hence are not entirely comparable. There are significant differences in the age distribution of

Table 4. Varietal yield of California olives, 1940–59

Variety	1940–44	1945–49	1950–54	1955–59
Ascolano	1.50	1.60	2.00	2.46
Sevillano	2.64	2.10	2.10	2.04
Manzanillo	3.55	2.44	2.17	2.25
Mission	2.08	1.50	1.52	1.20
Others	0.53	0.49	0.73	0.68
All	2.04	1.53	1.74	1.67

bearing trees among varieties and at different years. Nevertheless, yield is considerably higher for Ascolano, Manzanillo, and Sevillano than for other varieties.

Similar data are not available for comparing directly yields in the several districts. It has been estimated, however, that the usual yield for good commercial acreage (of mature trees) varies markedly among areas. These variances arise partly from differences in varietal composition. The principal cause, however, is differences in soil fertility.

Over the years in California, per-acre yields for olives have been about 25 to 30 per cent of those for deciduous tree fruits and grapes. Yield increased substantially during the past quarter century as it had for other fruits. Presently yields are three times the 1920–34 average for olives, compared with increases of 115 per cent for deciduous fruits and 75 per cent for grapes. Yields since 1920 are compared in table 5.

Probable Yields

Presumably, improved cultural practices increase yields. Good cultural care will continue to be used—unless prices decline so much that the cost becomes prohibitive. But even if trees are neglected, better care in the past will continue to have a beneficial effect, though with diminishing amplitude, on yield for the immediate future.

In view of these considerations and the changes in varietal, geographical, and age distribution of trees, a small increase in yield (of some 10 per cent to 2.0 tons per bearing acre on the average for the entire state) is likely for the early 1960's. A sharp increase above the present level, however, is not expected.

Chemical spray thinning is being used more widely each heavy-crop year. Growers do not seem to object to the expense of application even though this practice has not yet been shown to be very effective in alleviating alternate bearing for olives. The practice, however, does overcome the undesirable situation created in the "on" years when trees bear large crops of very small fruit.

Presumably cultural practices may be modified in this and other ways in an attempt to reduce the undesirable effect of alternate bearing. It is expected, however, that for the years immediately ahead annual fluctuations in yield will continue at about the present magnitude.

Table 5. California yields for olives and other fruits

Years	Olives	Deciduous tree fruits	Grapes
	Tons per bearing acre		
1920–34	0.6	3.3	3.8
1935–39	1.1	4.2	4.5
1940–44	2.0	4.5	4.8
1945–49	1.5	5.9	5.6
1950–54	1.7	6.3	5.7
1955–59	1.7	7.2	6.7

PRODUCTION

Past changes in acreage and yield, present trends, and estimates of future levels are discussed above. Figure 4 shows the relationship of acreage and yield in determining the general course in production.

Production Trends

The average olive crop increased from 8,200 tons in 1910–14 to almost 50,000 since 1945. This expansion, however, was not at a uniform rate. The increase averaged some 500 tons per year until the mid-1930's. Then, as bearing trees became older and yield rose, production expanded much more rapidly. Actually it is difficult to show this rate because the care with which harvesting was done during the war period, especially 1940–

43, gave abnormally large crops. If these years are disregarded, production increased by about 2,000 to 2,500 tons per year.

Annual fluctuations in production are very large because of considerable variations in yield. During the past twenty years these short-run changes in production amounted to 19,000 tons, or about 40 per cent of the average crop.

Probable Production

Our estimates of the production trend for the years ahead are a combination of forecasts of bearing acreage and yield. From information now available we conclude that for the next few years bearing acreage is likely to continue at about the present level and that yield will probably increase moderately. Thus, the usual crops for the early 1960's should be somewhat above the average for the 1950's but the production increase will be relatively small.

This projection assumes:

¶ Good cultural practices will continue in the major producing areas, even if prices decline.

¶ Tree removal will be at or near the rate prevailing since 1950.

¶ Bearing acreage will shift to the more productive varieties and to the South San Joaquin District (where yields are higher), and will include a larger proportion of trees at full maturity.

CROP UTILIZATION

Table 6 summarizes disposition data for the past fifty years. This information clearly shows two major changes. An abnormal situation prevailed during the 1940's. Utilization increased much less rapidly for fresh sales and crushing than for canning and other processing.

Wartime Demand

United States imports of olive oil were greatly curtailed during World War II and continued to be relatively low for a few years thereafter. The domestic olive industry adjusted to this situation in two ways: 1) Quantities harvested were increased by using greater care to pick all available supplies on commercial acreage and to pick from trees used as border

Table 6. Production and utilization of California olives, 1910–59

Average	Production*	Quantities utilized for:				
		All sales	Fresh sales	Canning	Crushing	Other processing
	Tons, fresh weight					
1910–14	8,200	8,000	100	2,300	5,040	560
1915–19	9,400	9,200	220	3,800	3,760	1,420
1920–24	10,200	10,000	240	5,140	3,300	1,320
1925–29	18,200	18,000	540	9,540	6,180	1,740
1930–34	18,000	16,800	500	7,980	6,340	1,980
1935–39	31,000	30,500	900	10,440	14,740	4,420
1940–44	56,000	55,800	940	14,660	30,000	10,200
1945–49	42,200	42,000	420	17,720	17,000	6,860
1950–54	48,200	48,000	560	25,780	14,440	7,220
1955–59	47,600	47,000	500	29,000	9,680	7,820

* Difference between production and all sales consisted of 200 tons per year used directly by the farm household and of quantities not utilized during 1932, 1938, and 1958.

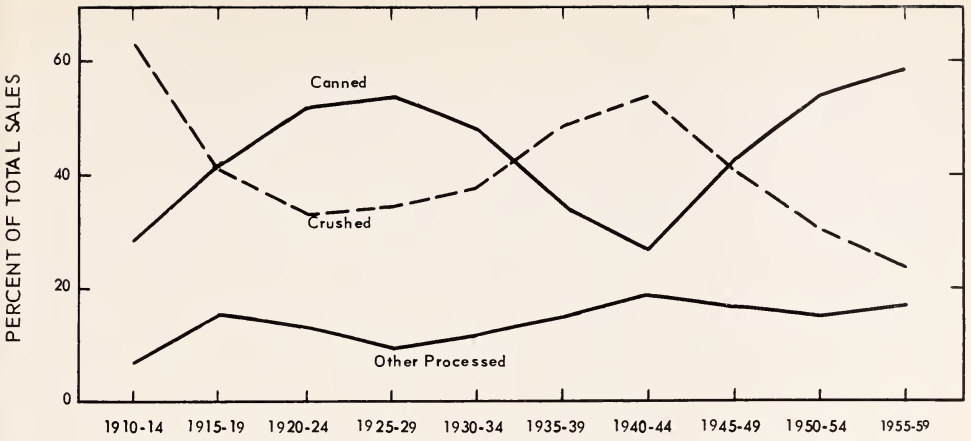

FIGURE 5. California Olives: Disposition of Sales, 1910–59.

plantings, and 2) prices for crushing olives were raised sharply to direct a larger proportion of the supply into oil extraction.

These devices were successful. During 1940–44, production was raised to 56,000 tons, an average exceeding by a large margin the average crop for any five-year period before or after World War II. Similarly, the quantity crushed was far above the average for other years.

Past Changes

This situation of the 1940's is omitted from our discussion. Attention is focused primarily on the usual conditions and their changes over time.

Since 1910–19 the use of olives increased threefold for crushing and fresh sales compared with ninefold for canning and other processing. As a result, of course, the relative importance of the various processing outlets changed significantly. Figure 5 shows this shift in the utilization of the olive crop.

Canning rose from 29 per cent of all sales in 1910–14 to 50 per cent in 1920–34 and 58 per cent since 1950. "Other processing" increased from 11 per cent in 1910–29 to 16 per cent for recent years. Use of olives for crushing declined correspondingly—from 60 per cent in 1910–14 to 26 per cent in 1950–58.

Purchases by canneries vary less from year to year than purchases by crushers. Since 1940, annual variations in farm sales for canning were 31 per cent of average purchases compared with 60 per cent for crushing. Thus, as production changes annually, the greater part of the difference is reflected by large variations in quantities crushed into oil.

Varietal Usage

In California, olive varieties are used for special purposes much more than other tree crops. This specialization is indicated by the data in table 7.

Mission is used extensively for both crushing and canning—50 and 40 per cent, respectively, of the average crop since 1950. Crushing represents 15 per cent of the crop for Manzanillo and 5 per cent for Sevillano and Ascolano. Two thirds or more of each of these three varieties are canned. The processing of other olive products is specialized. For example, practically all Greek and Sicilian style olives, respectively, are made from Mission and Sevillano varieties. Fresh sales for these four major varieties are negligible.

A significantly different utilization pattern prevails for the minor varieties. Spanish green takes 40 per cent of the crop, canning and crushing 30 per cent, and fresh sales (for home processing)

Table 7. Varietal utilization of California olives, 1950–59

Outlet	Manzanillo	Mission	Sevillano	Ascolano	Other	All
	Tons					
Canned	12,994	6,541	6,226	1,452	177	27,390
Crushed	2,988	8,441	402	108	121	12,060
Spanish green	1,700	412	1,271	63	424	3,870
Greek style	44	935	1	0	0	980
Sicilian style	9	9	892	4	16	930
Other processed	892	675	193	149	31	1,940
Fresh	112	45	111	4	258	530
Total	18,739	17,058	9,096	1,780	1,027	47,700

25 per cent. Thus, these minor varieties represent almost half of the fresh sales although their production is barely 2 per cent of the total.

CANNING

Normally over half the olive crop (50 to 60 per cent) is canned and the farm price for canning olives is about 2½ times the average for other uses. Thus, about 75 per cent of the farm income for olives is derived from cannery sales. In other words, canning is the most profitable as well as the most important outlet for the grower's production of California olives.

Olive Canners

California olives are marketed primarily by processor-canners whose chief product is canned olives (ripe or green-ripe). Several of these processors also pack other items, such as Spanish green, Greek style, Sicilian style, and chopped or sliced olives. A very few manufacture olive oil. Generally, however, oil is extracted separately by some 30 to 40 olive oil plants—most of which do not operate each year.

Nine of the 13 canners located in Butte, Tehama, and Tulare counties pack other olive products. There are seven other canners in northern California and six in the southern part of the state. Only two of these pack other olive products.

Four of the 26 olive canners pack products other than olives. To convey proper emphasis, it might be better to say that four processors of other commodities also can olives. Their combined production is a significant portion of the total pack. This situation is in contrast to that for most other California canned products. Generally in this state canners who limit their pack to one or two fruits and vegetables represent a relatively small proportion of the production of those products.

At present there are six grower-owned coöperatives, eight grower-canners, and 12 independent canners. (There is considerable difficulty in drawing a line between grower-canners and independent canners. Here a grower-canner is defined as one who controls at least 50 per cent of his product as a sole proprietor, through outright company ownership of groves, through a profit-sharing arrangement with his growers, or by informal buying arrangements of the company with its stockholders or partners.) These three groups share the pack of canned ripe olives almost equally. Thus, the coöperatives and grower-canners, on the

average, pack about twice the volume processed by independent canners.

The past decade saw several significant changes occurring in the composition of the olive canning industry. Two plants that were independent canneries in 1950 were reorganized as coöperatives. Three companies began packing olives. Seven canners went out of business. That includes two of the larger canneries, with a combined pack representing over 10 per cent of the 1950–51 total. Two companies are operating at new locations without a change in management.

Preparation for Canning

Canned ripe olives are prepared from properly matured olives which are treated to remove their characteristic bitterness. They are picked when straw-colored and may be held in brine for several months before being processed. After a rather complex series of treatments involving neutralization of the bitterness by applications of sodium hydroxide, olives are packed in a salt solution and processed by heat for preservation in hermetically sealed containers.

Two distinct types are produced. The "ripe type" are olives treated and oxidized to produce a typical dark brown to black color. "Green ripe" olives are not oxidized in processing. Their color ranges from green-yellow or yellow-green to mottled tan or brown, depending on the maturity of the fruit and the individual preference of the canner. Generally these two different types are considered to be canned ripe olives. (U.S.D.A. Standards established three classifications by splitting the "green ripe" category into two groups: "green-ripe" and "tree-ripened." This distinction, made to satisfy a small group, does not reflect general industry practice and is not used here.)

The principal outlet for canned ripe olives is in the form of whole unpitted olives. In recent years, however, other packs have become important. Pitted olives account for about a quarter of the pack. Next in importance are chopped and sliced ripe olives. (A few canners pack a small volume of halved olives—i.e., pitted olives which are cut lengthwise into two approximately equal parts.) Finally, as a salvage outlet the large pieces broken during the pitting operation are packed as broken pitted olives.

Grade Standards

Marketing contracts for many agricultural products frequently specify the voluntary use of U.S.D.A. grade standards. These standards are revised periodically to reflect changes in manufacturing techniques and marketing practices.

In the case of canned olives the use of U.S.D.A. grades is limited primarily to purchases by governmental agencies. Sometimes federal standards are used to settle disputes about quality of canned olives shipped to private-label buyers. They may be used as a sales gimmick by a canner trying to establish himself in a new territory. Generally, however, olive canners sell to the trade by sample and not on the basis of grade standards.

U.S.D.A. Standards, originally adopted in March, 1941, were revised in November, 1959, to accomplish two purposes: 1) to provide a better basis for the Department's internal regulations and 2) to liberalize the treatment of defects. The industry had long desired this liberalization and welcomed the change even though the standards are seldom used for private sales.

The earlier standards applied only to whole pitted olives. Other packs are covered by the revision.

Four grades (U.S. Grades A, B, C, and Substandard) are established. Quality factors used for determining grade were changed substantially from those in effect since 1941. Although flavor is evaluated and noted on the score sheet, it no longer affects grade. Comparison of the old and

Table 8. Quality scores of U.S.D.A. standards for canned ripe olives

Factor	March, 1941, standards*	November, 1959, standards	
		Single sizes*	All others
Flavor	30	0	0
Color	15	20	25
Character of fruit	25	30	37½
Absence of defects	10	30	37½
Uniformity of size	10	20	0
Uniformity of symmetry	10	0	0
Total points	100	100	100

* For whole pitted olives only.

new scoring system (see table 8) indicates the extent of the change.

Size Designations

The controlling legislation for size-grade designations for canned ripe olives is the California Ripe Olive Standardization Act of 1931, as amended several times. U.S.D.A. Standards merely reflect the size-grades enacted into state law.

The state law recognizes 16 designations for size-grades: three alternate names for the smallest olives, eight other single sizes (with two alternates), and three blends. In addition, many packers market their largest olives as "Special Super Colossal." Some canners use still other names (such as "Cadet," "Guest," and "Queen") for mixed sizes. Often housewives, and sometimes even dealers, are unable to keep the proper order of all these size names in mind when making their purchases.

The nine single sizes range from "Small" to "Super-Colossal." These designations represent olives which vary a great deal in size—from 8.4 olives per ounce for "Small" to 4.4 for "Mammoth" and 1.9 for "Super-Colossal." For each size-grade the olives must be fairly uniform in size and approximate the count, on a drained weight basis, given in table 9.

In recent years mixed sizes have been used with increasing frequency. The state law was amended in 1953 to secure greater uniformity. Three blend sizes, constituting mixtures of specified individual sizes, were established with the following count: 91 to 105 for "Family," 45 to 53 for "King," and 34 or less for "Royal." Thus "Family" is on a par with "Large," while "King" and "Royal" are slightly smaller than "Jumbo" and "Super-Colossal."

Table 9. Size grades for California canned ripe olives (California Ripe Olive Standardization Act)

Size-name designation	Count per pound	
	Average	Range
Small (or Select or Standard)	135	128–140
Medium	113	105–121
Large	98	91–105
Extra large (or Picnic)	82	76–88
Mammoth (or Gem)	70	65–75
Giant	..	53–60
Jumbo	..	46–50
Colossal	..	36–40
Super colossal	..	32 or less

U.S.D.A. Standards, as revised in 1959, designate the same size-grades, including blend sizes, with two minor exceptions. "Picnic" and "Gem" are not specified as alternate names for "Extra Large" and "Mammoth." "Special Super Colossal" is specified as a single size for the largest olives. Actually these size-grades are not very different from those contained in the 1941 Standards. The three blend sizes and "Special Super Colossal" were added by the revision. In addition, size of canned pitted olives is given by illustrations (attached to the Standards) which show size before pitting.

Some dissatisfaction has been expressed in the past with the olive industry's method of designating size. One view, published in 1953, was as follows:

> "Dealers believe that there are too many sizes of ripe olives. They think the present sizing is confusing, misleading, and detrimental to best merchandising and advertising operations. They suggest reducing the number of ripe olive sizes and simplifying the naming of them. For the sake of uniformity, they believe that this should be done on an industry-wide basis."[3]

This challenge has not yet been met by olive canners. It is realized, of course, that grading standards must recognize processing techniques. But it is doubtful whether the present array of size names facilitates the marketing of canned ripe olives.

The Pack

Production of canned ripe olives has expanded steadily except for a decline during the early years of the Great Depression of the 1930's. The pack increased from an average of 650,000 cases in 1926–39 to 1,100,000 in 1940–49 and to 2,200,000 in 1955–58. This threefold expansion represents an annual rate of 65,000 cases (5 to 6 per cent) during the past twenty-five years.

Annual fluctuations in the pack, though substantial, are smaller than variations in the crop. During the past twenty years these short-run changes amounted to 425,000 cases—28 per cent of the average pack—compared with fluctuations of 40 per cent in production.

Often the carry-in of canned ripe olives into the new pack year is fairly sizable. It averaged 290,000 cases since 1947—one sixth of the annual pack of 1,760,000.

Container Sizes

Over two thirds of the pack is in pint-size containers—62 per cent in the No. 1 tall can. Smaller sizes are used for 12 per cent of the pack, and the larger No. 10 cans for 18 per cent. This pattern, prevailing since World War II, represents a change from former years. The use of larger containers (No. 10 and the Quart) declined. No. 1 tall replaced some of the pack formerly in other pint sizes. Small containers are relatively more important than formerly.

In 1942–45 over half of the pack (55 per cent) was in glass because of wartime restrictions on the use of tinplate. Normally, however, 99 per cent of the pack is in tin containers.

Fruit Size

Figure 6, presenting 1948–51 averages, shows a typical distribution of the pack by fruit sizes. A pronounced bimodal pattern exists because both small-fruited and large-fruited varieties are canned in large volume. On a varietal basis the bulk of the pack (90 to 95 per cent) is of sizes "Small" to "Extra Large" for Mission and Manzanillo and of sizes "Giant" to "Colossal" for Sevillano and Ascolano.

The average fruit-size composition of the pack has not changed much in recent

[3] Randolph, Julian P., *Food Trade Marketing Survey for Canned Ripe Olives.* California Dept. Agr., 1953, 70 pp. This survey was conducted for the California Olive Industry under a project financed jointly by the California State Department of Agriculture and the United States Department of Agriculture. The quotation above is in the introduction to section 8 of the report (pp. 39–48).

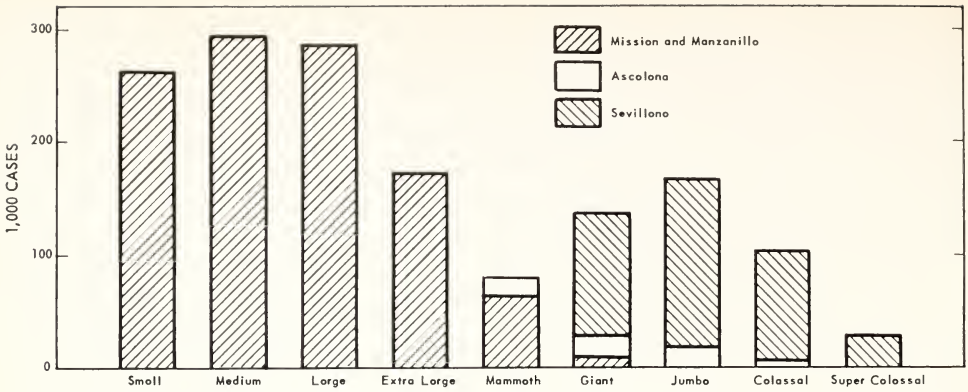

FIGURE 6. California Canned Ripe Olives: Pack, by Variety and Fruit Size, 1948–51.

decades. Some changes, however, can be noted from the data summarized in table 10. The intermediate sizes ("Large," "Extra Large," and "Mammoth") declined in relative importance—from 41 per cent of the total in 1938–47 to 35 per cent thereafter. Most of the offsetting increase was in "Giant" and "Jumbo."

The fruit-size composition varies considerably from year to year. Annual changes amount to about one quarter of average percentage packed in each size. These short-run changes are least for the smaller sizes and greatest for the larger sizes. During the past twenty years they averaged 14 per cent for "Small," "Medium," and "Large," 23 per cent for "Extra Large" and "Mammoth," and 31 per cent for "Giant," "Jumbo," and "Colossal."

Table 10. Pack of canned ripe olives, by fruit size

Fruit size	1938–47	1948–57
	Per cent of total pack	
Substandard	3.3	0.0
Small	13.8	16.7
Medium	17.2	18.4
Large	19.3	17.9
Extra large	13.7	11.7
Mammoth	7.7	5.8
Giant	6.2	8.0
Jumbo	8.4	10.0
Colossal	7.4	7.4
Super colossal	2.9	2.6
Other*	0.1	1.5

* Pack of ungraded sizes or of blends not reported on a grade basis.

Shipments

Relative shipments of canned ripe olives have changed. A greater proportion of the supply goes to out-of-state markets than formerly. Currently shipments are made more uniformly throughout the season than even a few years ago.

The geographical pattern of canned-olive consumption can be approximated by the delivery data in table 11. The delivery data were compiled from shippers' manifests by the California Olive Association for 1934–36 and by the Olive Advisory Board for most years since 1947. Their major drawback for our use arises from the fact that they are not corrected for diversions beyond initial destinations. It is believed, however, that such adjustments, if made, would not substantially alter the conclusions given above.

Consumption varies greatly among major areas of the country and changes at different rates. The typical Californian uses 2.5 cans annually, compared with rates of 1.0 in other western states, Illi-

Table 11. Deliveries of California canned ripe olives

Area	1934–36	1950–57	1950–57 cans per person*
	1,000 cases		
California	326	707	2.54
Other United States	327	1,366	0.44
Exports	7	47	...
Total	660	2,120	...
	per cent of total		
New York	12.0	14.0	0.94
North East, other	8.0	12.1	0.50
Illinois	10.2	8.8	0.98
North Central, other	7.3	11.6	0.31
South	2.4	6.0	0.12
West, excluding California	9.7	12.0	1.18
U. S., excluding California	49.6	64.5	0.44
Exports	1.0	2.2	...
California	49.4	33.3	2.54

* Average deliveries (per year) converted at 48 No. 1 tall cans per standard case.
Note: U. S. per capita consumption averaged 0.62 in 1950–57 and 0.25 in 1934–36. Per capita figures in 1934–36 were 2.47 for California and 0.13 for other states.

nois, and New York; 0.4 in other northern states; and 0.1 in the South.

Since the mid-1930's, sales doubled in California markets and quadrupled in out-of-state markets. As a result, the proportion shipped interstate increased from 50 to 65 per cent of the total. On a per capita basis, consumption remained constant (at 2.5 cans annually) in California and tripled (from 0.13 to 0.44), on the average, in other states.

The monthly distribution of shipments shifted considerably during the five-year period extending from 1947–51 to 1952–56—see figure 7 on page 30. Early movement during December–March declined from a monthly rate of 10.5 to 8.9 per cent of the season total. Most of the offsetting increase occurred in late shipment—from 6.5 to 7.8 per cent on the average for September–November. Fluctuations in monthly shipments were reduced sharply. (In statistical terms, the standard deviation of monthly shipments—about the average of 8.3 per cent decreased between 1947–51 and 1952–56 from 1.89 to 0.79 percentage points.) In 1952–56, shipments ranged from 10.1 per cent in January to 7.1 per cent in September, compared with variations from 12.0 to 5.7 per cent in 1947–51.

OLIVE OIL

Generally, California olive growers direct their cultural practices toward producing canning olives because canners pay higher prices for the larger and higher-quality olives. A substantial por-

tion of the crop remains for crushing and other processing outlets. The farm price for oil olives is about 30 per cent of the canning price.

Olives for Oil

Most of the olives crushed are fruit unsuitable for canning, or are surplus fruit above canning needs. Crushing is an important outlet for olives of the small-fruiting varieties. It provides a salvage outlet for the small, cull, or damaged olives of other varieties. In seasons of early frost, when olives are damaged too badly to be canned, the oil mills become an important outlet for frozen olives since freezing does not affect the fruit's desirability for crushing. When olive oil prices are extremely favorable (as in the early 1940's) many more olives are used for oil extraction.

Olives intended for oil production are crushed when fully ripe. To produce the best quality, the oil is removed immediately from the residual pulp. That prevents the formation of free fatty acids, which may induce rancidity. The pulp may be pressed a second time to produce oil, which is then deacidified, decolorized, and deodorized to produce refined olive oil. Practically all of the olive oil produced in normal seasons in California is virgin oil, while most of the imported olive oil is refined or blended oil. Normally the oil salvaged from pomace by the solvent process is used for soap and other nonfood uses.

The extraction yield depends mainly on the variety, maturity, and the efficiency of the equipment used for pressing the oil. Maturity is important. The oil content increases markedly as fruit color changes from green to straw to red to black. The oil content of olives also varies with prevailing climate and cultural practices followed. In California the yield of oil ranges from about 10 gallons per ton for green culls to around 50 gallons for prime oil fruit of the Mission variety.

Because of varietal differences in oil content and in cannery demand (arising from fruit size), there are substantial differences in the use of different varieties for crushing. Currently about 50 and 15 per cent of the Mission and Manzanillo crops are crushed, compared with an average of 5 per cent for other varieties. These two varieties, respectively, supply 75 and 20 per cent of the olives used for oil.

Production and Consumption

California's production of olive oil reached a peak during World War II when olive prices were very high. Under these circumstances growers fertilized their groves more and took better care of them and, as a result, production rose sharply—but not for long. As labor costs increased considerably above prewar levels and imports were resumed, the production of olives for oil became less profitable and growers gave less care to their trees except when producing cannery fruit.

Production of olive oil in California now averages 500,000 gallons. This represents a substantial decline from the peak production of 1.2 million reached in 1940–44, yet is considerably above the prewar level—250,000 gallons in 1925–34.

Domestic supplies provide only 6 per cent of United States consumption. Consequently, large quantities are imported each year. Imports, however, are declining because consumption is being reduced. The use of edible olive oil is down a quarter from prewar in total quantity and almost half (45 per cent) on a per capita basis. Consumption of salad, table, and cooking oils is shifting to other domestic oils, which are available at much lower prices.

Olive Oil Crushers

This shift in consumption has produced a substantial change in the composition of the industry. Many plants manufacturing olive oil during World

War II, when large quantities of olives were crushed, no longer operate regularly. Some have been dismantled and shipped abroad. Others remain intact but crush olives only in occasional years. Even operators of larger oil mills who farm substantial acreages on their own try to move as much of their crops as possible to more profitable uses. No new plants have been erected in recent years. Most of the mills now used, however, have been expanded and modernized to increase their efficiency for extracting high-quality oil.

Because of these circumstances it is difficult to indicate how many olive-oil plants there really are. About 30 or 40 have produced some olive oil during the past five or six years. In a typical season, however, the great bulk of the domestically produced olive oil (at least 95 per cent of the total production) comes from 10 to 12 plants. Several other plants crush oil fairly regularly but in limited volume. Sometimes growers encounter difficulty in getting their olives crushed, even on a salvage basis, because of the reluctance of crushers to operate their plants unless they have an assured market for a substantial volume of olive oil.

OTHER OLIVE PRODUCTS

Olives are also processed into other products. These volumes are considerable although relatively small in comparison with olives canned or crushed. About 7,500 tons, five times the 1910–34 average, are used annually for these other products. Half of these olives are processed into California Spanish green. A quarter is used for Greek and Sicilian styles and a quarter for chopped, sliced, and brine-cured olives.

Some quantities of each major variety are used for these olive products. But generally such use is largely for processing one or two of the specialty packs, which vary from variety to variety. This specialization for "other processing" has already been mentioned (see table 7 and accompanying discussion, above).

Spanish green olives are produced mainly from Manzanillo and Sevillano—respectively, 40 and 35 per cent of the total. The use of other varieties for this product has increased sharply since 1940. The bulk of the nation's supply of Spanish green olives is imported since domestic production is small relative to demand. Yet, California exports a significant part of its pack, chiefly to Latin America, because domestic demand is not particularly good for the smallest sizes packed in the state.

Greek style olives are made by dry-salt curing mature olives or by packing them in vinegar and brine. They are eaten as a relish or are used as a flavoring. Almost the entire pack consists of the Mission variety.

Sicilian style olives are green olives fermented in brine and packed with garlic, peppers, and spices. Their production comes almost entirely from surplus Sevillano olives.

Most of the chopped, sliced, and brine-cured olives are Manzanillo and Mission. Other varieties are coming into use in larger quantities for these products.

FRESH SALES

Although fresh uncured olives can be shipped for considerble distances, only limited quantities are so marketed. Fresh sales generally amount to about 300 to 1,000 tons per year—about 1 per cent of the crop. The large, firm Barouni olives comprise a large portion of fresh shipments. Fresh sales are a major outlet for this variety. In some years significant quantities of other varieties are shipped.

These shipments are made chiefly to eastern cities for home processing by persons of Mediterranean descent. The farm price is generally about 15 per cent below that received for canning olives.

IMPORTS-EXPORTS

We have already mentioned this country's foreign trade in olive products. It may be well, however, to give more detail since imports, especially olive oil and Spanish green olives, constitute the bulk of our supply of certain olive products.

Olive Oil Imports

Olive oil production is concentrated in the Mediterranean Basin. These countries are also the largest consumers. Hence, only a fifth of the 300-million gallons of olive oil produced annually enters foreign markets.

The United States is a leading importer of olive oil. Before World War II (1920–34 average) imports averaged some 10 and 6 million gallons, respectively, of edible and inedible olive oil. Following the war, imports of edible olive oil increased to 70 per cent of the 1920–34 level. Imports of inedible olive oil, however, continued low—at 6 per cent of prewar. The importance of imports in supplying needs for United States consumption is indicated by table 12. Excluding the abnormal conditions of the war period and immediately thereafter, imports account for 93 per cent of the edible olive oil used in this country.

Our imports come chiefly from Spain and Italy. Several substantial shifts have occurred since the prewar period—see table 13. Imports of edible olive oil from Spain increased from 2.6 to 3.4 million gallons—from 30 to 50 per cent of the total. There was much expansion also in imports from North Africa but this volume is still relatively small. Imports from Italy and other countries declined by over one half. Practically all imports of inedible olive oil have stopped, except for a relatively small quantity still coming from Portugal.

Other Imports

Brined-olive imports are large. About 12.6 million gallons are imported currently compared with a prewar average of 6.3 million and of 8.6 million during the 1940's. Normally, 90 per cent or more of these quantities come from Spain. Most of the remainder originates in Greece. These imports are predominantly Spanish green olives—an average of 94 per cent since 1940. Such imports contribute 90 per cent of the Spanish green olives consumed in the United States. Table 14 summarizes these import data.

The United States also imports a relatively small quantity of dried olives—called Greek-style olives in this country. About 300 tons come from abroad compared with a prewar average of 250 tons.

Table 12. U. S. supply of olive oil, 1920–58

Item	1920–34	1935–39	1940–44	1945–49	1950–58
	million gallons				
Inedible olive oil					
U. S. imports	5.96	4.47	0.51	0.39	0.35
Edible olive oil					
U. S. imports	9.79	8.40	1.15	3.06	6.92
California production	0.21	0.59	1.20	0.68	0.50
Total supply	10.00	8.99	2.35	3.74	7.42
Per cent imported	97.9	93.4	49.0	81.8	93.3

Table 13. U. S. imports of olive oil, 1930–57

Country of origin	Edible olive oil		Inedible olive oil	
	1930–39	1950–57	1930–39	1950–57
	million gallons			
Spain	2.6	3.4	1.1	*
Italy	4.7	1.9	1.6	*
North Africa	0.3	0.9	1.3	*
Greece	0.6	0.3	1.3	*
Others	0.6	0.3	0.5	0.4
Total	8.8	6.8	5.8	0.4

* Included in "others."

Exports

Annual shipments to foreign markets usually amount to about 1,000 to 1,600 tons, basis of fresh fruit equivalent. These exports are small relative to the average crop (50,000 tons) and to imports (equivalent to some 220,000 tons of fresh olives).

Exports are principally to nearby countries. Canada and Mexico receive two thirds of the total. Another 20 per cent goes to other areas of the Western Hemisphere. The remainder (12 per cent) is divided almost equally between the Philippine Republic and the rest of the world. Although exports going to individual countries, especially to those receiving a small volume, vary considerably from year to year, the summary appearing in table 15 indicates the relative importance of different countries of destination during recent years.

U. S. Tariffs

For many years this country has maintained tariff protection for the olive-processing industry. Two major changes in import duties have been made during the past quarter century. Rates established by the Tariff Act of 1922 were raised in 1930, by 25 to 50 per cent on major import items. In 1950, several reductions were made after negotiations

Table 14. U. S. imports of brined olives, 1925–58

Country of origin and type	1925–39	1940–44	1945–49	1950–58
	million gallons			
All brined olives				
Spain	5.63	7.52	8.71	11.42
Greece	0.44	0.08	0.51	0.73
Other countries	0.26	0.10	0.29	0.42
Total	6.33	7.70	9.51	12.57
Spanish green olives	....	7.35	8.78	11.84
Per cent of all brined	....	95.5	92.3	94.2
Per cent of U. S. consumption	....	81.7	88.3	89.2

Table 15. U. S. exports of olives, 1955–59 average

Country of destination	Quantity (1,000 lbs)	Per cent
Canada	1,200	47.3
Mexico	442	17.4
Cuba	62	2.4
Other off-shore islands*	139	5.5
Central America	155	6.1
Venezuela	155	6.1
Other South America	46	1.8
Philippine Republic	155	6.1
Other countries	184	7.3
Total	2,538	100.0

* Includes Bahamas, Bermuda, Dominican Republic, Haiti, Jamaica, and North Antilles.

with Greece and Italy under provisions of the General Agreement on Tariffs and Trade (GATT), adopted at Geneva in 1947. The major changes were decreases of about 50 per cent for edible olive oil, dried ripe olives, and certain packs of brined olives. Table 16 presents the rates established by the tariff acts of 1922 and 1930 and those in effect for 1950–60.

Inedible olive oil (for mechanical and manufacturing purposes) is on the free list, as it has been since 1890. It is the only olive product exempt from the tariff.

The present duty on edible olive oil, amounting to 4.75 cents per pound for large containers and 3.25 cents for small containers, is half the levy prevailing before 1950. It is much less burdensome to importers than formerly when rates were higher and prices were lower. On the other hand, California growers now get less tariff protection. The significance to consumers, dealers, and growers of changes in tariff duties is illustrated by considering olive oil. In 1950 the rate (for olive oil in large containers) was decreased from 6.5 to 3.25 cents per pound—this is equivalent to a reduction from $19.80 to $9.90 per ton of olives crushed. New York wholesale prices for edible olive oil (imported in drums) increased from 26.3 cents per pound in 1935–39 to 38.1 cents in 1955–58. Farm prices for olives sold to crushers increased from $38 to $67 per ton during this period. Thus the importance of the tariff relative to prices declined by two thirds—from 24.7 to 8.5 per cent of the wholesale price and from 52.1 to 14.8 per cent of the farm price.

Depending on the style of pack and type of container, the rate for brined olives varies from 15 to 30 cents per gallon: 15 cents for ripe olives, 20 cents for green olives, and 30 cents for pitted and stuffed olives in containers generally used for American imports. The rate for "other" brined olives and dried olives is 2.5 cents per pound compared with 5 cents in effect during 1930–50.

INDUSTRY CONTROLS

Compulsory control over the marketing of California olives was initiated in 1933. Operations, however, were not extensive until the past decade. During this period a variety of regulatory provisions was used. Experience gained under earlier programs led to suggested changes in the regulatory provisions and the administrative setup. The reader interested primarily in the presently used marketing

order can skip over the material of the first two subheadings of this section.

Early Program

The period 1933 to 1939 was one of experimentation. Compulsory marketing control was begun on December 13, 1933, with the adoption of a federal marketing agreement. Major reliance was placed upon price and volume control. Volume control was to be obtained through canner quotas and grower allocations. The minimum price and other regulatory provisions, though designed to facilitate volume control, were used separately. Minimum grower and f.o.b. prices were prescribed. Establishment of minimum f.o.b. prices on sales to distributors was deemed necessary as most of the pack of canned olives was sold by grower-processors and by coöperatives who do not buy olives at fixed grower prices. To make these price schedules effective, restrictions on allowances, brokerage fees, and other terms of sale were spelled out. This program was initiated too late to affect the size of the 1933 pack, and its volume control feature was not used in 1934. The program was terminated in November, 1933, after operating the pricing provisions for two seasons, when the price-fixing provision of the Agricultural Adjustment Act was declared unconstitutional.

A state program, issued under the California Prorate Act of 1933, was adopted on May 25, 1937. Since minimum-price provisions could not be used, the program merely permitted volume control to be established through grower prorates based on current crop estimates for individual growers. This proration plan proved grossly unsatisfactory and caused much controversy. The first state program was abandoned after the 1937–38 season.

Table 16. U. S. import duties for olive products, 1922–60

Description	Unit	Tariff Act of 1922	Tariff Act of 1930	In effect, 1950–60
		cents per unit designated		
Olive oil, inedible	..	free	free	free
Olive oil, edible				
Containers of less than 40 lbs	lb	7.5	9.5*	4.75
Containers of 40 lbs or more†	lb	6.5	6.5	3.25
Olives in brine				
Pitted or stuffed	gal	30	30	30
Ripe—in airtight container	gal	20	30	30
Green—in airtight container	gal	20	20	20
Ripe—not in airtight container	gal	20	30	15
Green—not in airtight container	gal	20	20	15
Other—not in airtight container	lb	..	5	2.5
Dried ripe olives	lb	4	5	2.5
Other olives	lb	35%‡	5	5

* Reduced to 8 cents on July 24, 1931, under Sec. 336, Tariff Act of 1930.
† Duty is on contents and container.
‡ Ad valorem rate.

Further Development

After a decade of no controls, the industry inaugurated a second state program, developed under terms of the California Marketing Act of 1937. It was applied from February, 1948, to June, 1955, and actually embodied two separate orders that complemented each other.

One order rejected the earlier proration scheme in no uncertain terms: "Nothing in this order shall be construed to permit . . . any quantitative prorate upon the deliveries, processing or packing of olives." It provided for: 1) advertising and sales promotion; 2) minimum quality and size requirements; and 3) research investigation. Program administration was by the Olive Advisory Board of seven producers and seven processors.

Assessments, levied equally on producers and processors, were limited to $12 per ton of processing olives. (The maximum rate was assessed each season except that for olives used for preservation as California green olives the assessment was $2 per ton in 1951–52 and $1.50 during the next three years.) Operations were undertaken each season from February 19, 1948, when the program was adopted, until it was discontinued on June 30, 1955.

The other order, adopted on March 4, 1952, established a stabilization plan to be administered by an Olive Stabilization Advisory Board of nine processors. The stabilization percentage was set at 30 per cent for the rest of the 1951–52 season and at 33 per cent for 1952–53. Processors were assessed 1½ and 1 cent per case of canned olives during the two seasons.

By July 1, 1955, the industry was again without a marketing control. A new market order, including a surplus control provision, was submitted for industry approval. Processors, however, failed to give the required assent. It became evident at the public hearing held in August, 1955, that the industry was divided over the stabilization issue. Producers refused to accept a program without volume control, and processors opposed such regulation.

Many in the industry still favored the advertising program. But two seasons passed before tempers cooled and details were worked out for the revivified order. In February, 1957, processors revived their previous stabilization program for use during the remainder of the 1956–57 season. A stabilization pool of 13 per cent was established and processors were assessed $1 per ton. When this order expired, in September, 1957, the various segments of the industry were ready to agree upon a single program—adopted on September 10, 1957, and operated in 1957–58 and 1958–59.

Present Program

The current marketing order, adopted on September 1, 1959, "shall continue in effect through January 31, 1964, unless sooner suspended or terminated." It is merely an extension in amended form of the 1957 order. The only major change is the addition of surplus control provisions. As a practical matter the present order is the latest version of the program initiated in February, 1948, and applied continuously since then except for a lapse of two years (June, 1955, to September, 1957) when the industry failed to agree on whether production control should accompany advertising activities.

Program administration and cost are shared equally by producers and processors. The Olive Advisory Board, which administers the program (subject to approval by the Director of Agriculture), is composed of nine producer and nine processor members. A maximum assessment of $13 per ton of processing olives is specified. (Since 1957–58 the assessment rate has been set at the maximum ($13) on olives processed into canned ripe olives and at $2 per ton on olives

processed into canned green-ripe olives, chopped olives, and sliced olives. This differential is maintained because the order stipulates that the portion of the assessment relating to advertising and sales promotion shall apply only to canned ripe olives.)

Five methods for improving returns to the industry are specified in the order:

1) The bulk of the funds is used for advertising and sales promotion. These monies finance "plans for promoting the sale of canned ripe olives for the purpose of creating new and larger domestic or foreign markets for olives as canned ripe olives. Such plans shall not promote the sale of a particular private brand, shall not make false or unwarranted claims on behalf of olives and shall not disparage any other agricultural commodity."

2) Necessary and proper research studies may be undertaken on the production, harvesting, processing, and marketing of olives.

3) Minimum quality and size restrictions are specified as a means of eliminating smaller olives from the processing of canned ripe and green-ripe olives. Such smaller olives may be used for other purposes, e.g., processing as chopped or sliced olives.

4) Surplus control over unprocessed olives is established to permit each producer to deliver a proportionate share of his production for processing as canned ripe olives. Proration is based on historical relationships instead of on forecasts of individual crops for the current season as was required by the 1937–38 program.

5) A stabilization plan is established to regulate the marketing of canned ripe olives. This plan is designed "to effect a reasonable correlation of the supply of canned olives with the market demand thereof," and to stabilize marketing conditions in the olive canning industry. The marketable quantity and the stabilization percentage for each season are determined from a consideration of available information on supply and demand conditions.

The industry considers the advertising provision to be the most important feature of its program and expects to use surplus and stabilization controls only occasionally when supply becomes excessive because of the alternate-bearing tendency of the olive. There are numerous details about the five provisions. The major ones are discussed below in a footnote.[4]

Accomplishments

Average monthly shipments for 1947–51 and for 1952–56 are compared in

[4] In essence, the minimum quality and size provision excludes from canning olives smaller than "Small" for Mission and Manzanillo varieties, "Medium" for Obliza, "Extra Large" for Ascolano, St. Agostino, and Barouni; and "Mammoth" for Sevillano and other varieties.

Surplus control is determined individually for each "olive property"—each piece of land planted to a single variety and operated by a single producer. The allotment is obtained by multiplying the "historical usage" by the "deliverable percentage." Historical usage is the higher of 1) average deliveries of the base period (the four seasons immediately prior to the current harvest season) and 2) 75 per cent of the largest delivery for any season of the base period. The deliverable percentage is set each season at a level not less than 70 per cent. Different deliverable percentages may be set for small- and large-fruited varieties based on supply-demand relationships for each group. Minimum delivery allotments are provided to cover special cases, such as young olive properties.

The stabilization percentage may not exceed the lowest of: 1) the percentage by which the January estimate of supply exceeds the August estimate of demand; 2) 10 per cent of the prospective available supply, if surplus controls are used to allot deliveries among producers; and 3) 20 per cent of the prospective available supply, if surplus controls are not used. In July the situation is reviewed and, if conditions have changed substantially, the stabilization percentage may be reduced—but not increased—for the balance of the season. Each producer is assured a minimum marketable quantity equal to 110 per cent of his deliveries during the immediately preceding season.

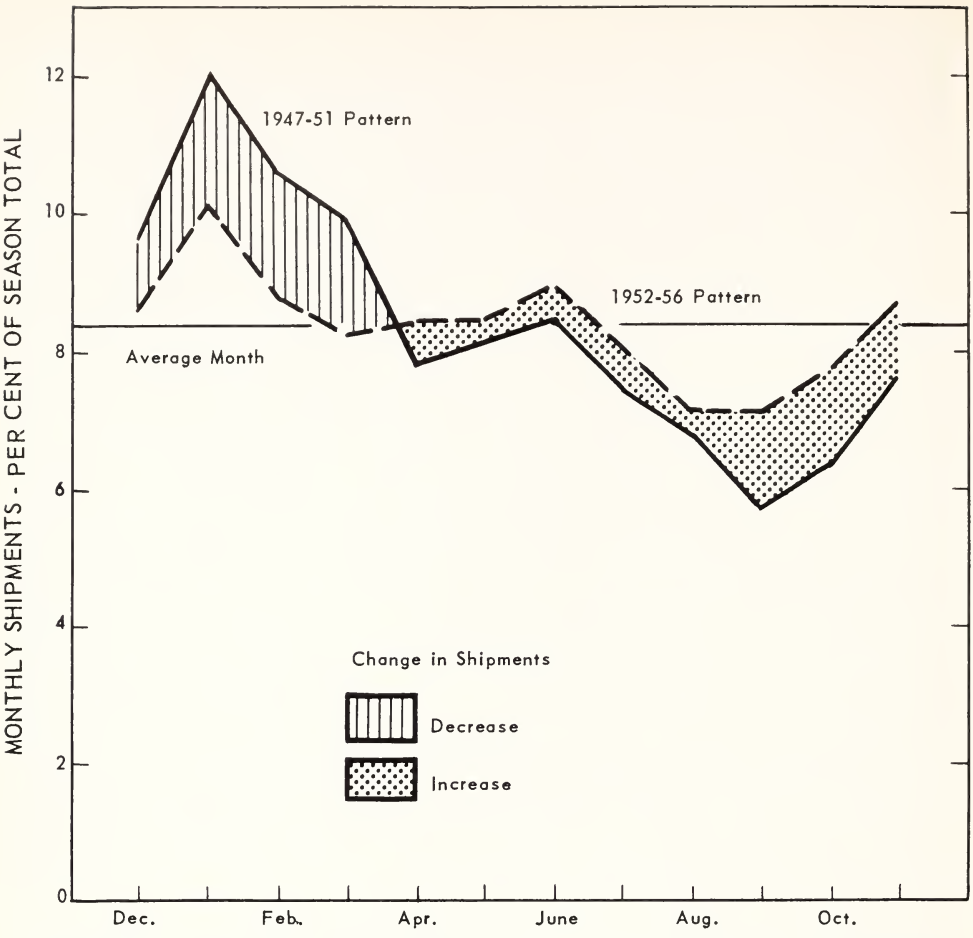

FIGURE 7. California Canned Ripe Olives: Shift in Monthly Shipments Averages for 1947–48 to 1951–56 and 1952–53 to 1956–57.

figure 7. Quite clearly, shipments are made considerably more uniformly throughout the marketing season now than a few years ago. This shift may not be due entirely to the introduction of the stabilization feature in March, 1952. The industry's advertising activities are designed to level out alternate large peaks and valleys in movement.

This result is the principal effect of the marketing program's operations that can be indicated. In addition minimum quality and size restrictions have eliminated smaller olives from the canning outlet. For example, during 1942–46 about 6 per cent of the pack was of substandard size. These smaller olives have not been packed for over a decade.

The program is too new to warrant other definite conclusions about its effectiveness. Data now available, although relating to only four seasons, seem to suggest that sales are more stable from one year to the next than would be the case without a program. The effectiveness of advertising expenditures in stimulating demand has not been studied.

Admittedly, little is known about the economic implications of marketing controls. Many of their price and other effects have not been measured. Operation of these programs, however, is not costly

except for funds expended on advertising. Continued support of the program presumably signifies the industry's confidence that short-run returns are improved without harming long-run interests.

Certain intangible and incidental, yet nevertheless real, achievements should be mentioned. Administrative procedures have shaken down into reasonably stable patterns. Most problems encountered in earlier years have been resolved to the mutual satisfaction of different groups within the industry. The program has served as a vehicle for getting growers and processors together for a better understanding of industry problems, the alleviation of mutual suspicions, and the dissemination of information. The program has also served as a focal point for numerous endeavors relating to production, processing, and marketing.

RETURNS TO OLIVE PRODUCERS

Farm prices may be quoted on several different bases, depending upon a varying amount of "added service" rendered by the producer. As used in this circular, "farm price" refers to the payment received by producers for "naked fruit at the first delivery point." Such prices have been reported by the California Crop and Livestock Reporting Service for each year since 1919 for olives sold in each utilization outlet and for "all uses."

General Level

Over the years, fluctuations in farm prices are due primarily to changes in consumer purchasing power and production. Both factors have varied widely during the past several decades. Prices ranged from a low of $32 per ton in 1932, at the depth of the Great Depression, to a record high of $374 in 1946, when demand was strong at the conclusion of World War II.

The effect of consumer purchasing power is shown by noting the cyclical movement in average farm prices during the past several decades. Prices dropped sharply from $77 per ton in 1920–29 to $36 in 1931–32. They increased, but only gradually, during the next decade, to $76 in 1941, and then rose sharply to a wartime peak of $281 in 1944–46. Since 1947 the price has fluctuated about an average of $175.

Year-to-year changes in farm prices arise mainly from annual variations in yield. Such changes have been substantial. For example, during the past eighteen years (when the price averaged $190 per ton) the price changed, from one season to the next, by $76 to $224 in six years, by $56 to $70 in six years, and by $5 to $45 in six years. These price changes are definitely correlated with opposite changes in production. For the year under discussion, a typical period, the annual price fluctuations can be explained as yearly variations in production. (In statistical terms, this inverse relationship is expressed by the coefficient of determination, $r^2 = 0.56$.)

By Outlets

Farm prices vary considerably by outlet. They are highest for olives sold to canners and lowest for those used by crushers. Relative to cannery prices, farm prices are about 30 per cent for crushing, 40 per cent for other processing, and 85 per cent for fresh sales. These relative prices are not drastically different from those prevailing before World War II. They were somewhat lower on fresh sales and higher for crushing and other processing. The general relationships among prices for the period since 1920 are shown in figure 8.

By Varieties

Differences in farm prices on a varietal basis arise chiefly from two factors. Substantially different proportions of the

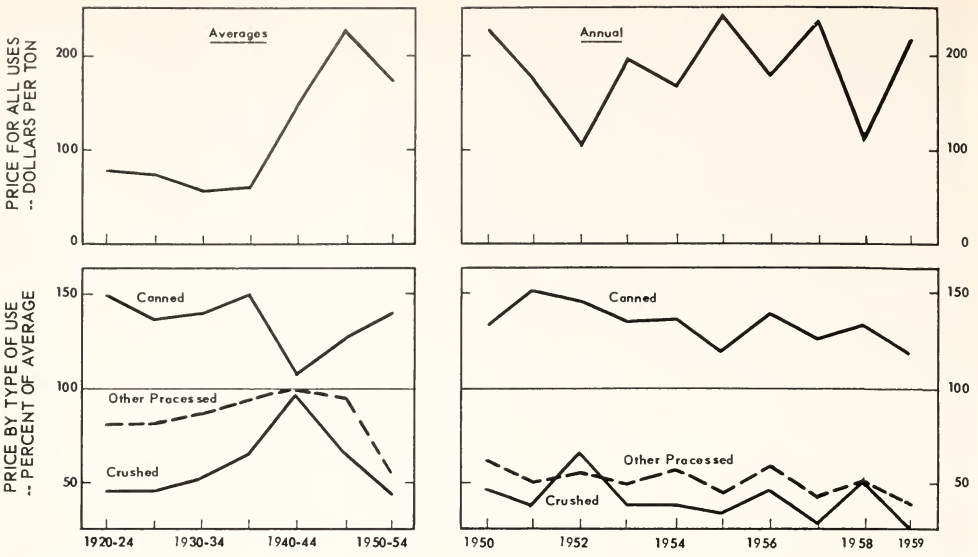

FIGURE 8. California Olives: Grower Prices by Type of Utilization, 1920–59.

several varieties are sold at the higher prices received for cannery olives. Furthermore, within the cannery outlet a wide range of prices is paid, depending on fruit size, with the result that the small-fruited varieties have a much lower cannery price than the large-fruited varieties. During 1948–52 the cannery price averaged about $210 per ton for Mission and Manzanillo, $340 for Sevillano, and $300 for other varieties. It ranged from around $200 for "Medium" olives to $300 for "Giant" and $400 for "Colossal."

Returns Per Acre

In considering profitability to growers, yield as well as price must be compared with production and harvesting costs. On the average, of course, fluctuations in price and yield are inversely related, so variations are smaller for returns per acre than for prices per ton. This comparison for the past twelve years is shown in table 17.

Future Returns

If future production continues in the pattern indicated, there will be a moderate increase in supplies available for canning. If imports continue at recent levels, most of the United States supply of canned olives will be domestic olives while the bulk of our supply of olive oil and brined olives will come from abroad. If consumer purchasing power continues to climb at or near the recent rate, demand will expand rapidly enough to absorb the additional supplies in sight.

Table 17. Comparison of grower returns for California olives, 1948–59

Year	Per ton	Per acre	Yield
1948	$145	$306	2.1
1949	190	241	1.3
1950	231	354	1.5
1951	173	398	2.3
1952	103	213	2.1
1953	198	202	1.0
1954	166	295	1.8
1955	242	302	1.2
1956	178	450	2.5
1957	236	313	1.3
1958	101	236	2.4
1959	229	220	1.0

On balance, therefore, farm prices should not be unduly depressed if the American economy continues its present growth. In fact, the general level may increase slightly. In occasional years, however, when bumper crops are produced, grower returns will decline substantially, as they have during past decades. Furthermore, there is no reason to expect a substantial change in the proportions of the crop entering different use outlets. Hence, farm prices for canning, crushing, and other uses should continue at about the present relationships.

Relative prices might be altered by operations of the industry's marketing program. Theoretically, the elastic consumer demand for canned ripe olives could be exploited more fully than is being done at present by restricting the pack drastically. Since this action would require, among other things, diverting substantial quantities of olives into lower-priced uses, such an attempt is not likely. The stabilization feature of the program could serve to reduce year-to-year fluctuations in farm prices. As a matter of fact, this result is being accomplished. But, again, regulations stringent enough to reduce annual variations in farm prices sharply are not likely to be attempted.

An example will serve to indicate the magnitude of the task. Suppose, for the sake of simplicity, that 1) without controls 70 per cent of the crop would sell at $250 per ton to canners, while 30 per cent would bring $100 for other uses and 2) a reduction in canning to 60 per cent of the crop could be accomplished without any decrease in the average price for other sales. Then the cannery price would have to be raised from $250 to $275 just to maintain the same returns to growers for their entire crop. And, of course, canners would have to be satisfied with packing a smaller volume. Actually, of course, the price for other uses would be depressed as sales were increased by a third (from 30 to 40 per cent of the crop). If this price declined only 15 per cent to $85, then the cannery price would have to rise to $285. It is probable that the relative price elasticity is such that an artificial restriction on the pack of canned ripe olives would decrease, rather than increase, total returns for the crop.

In a discussion of the future course of farm prices, mention must be made of costs incurred for processing and marketing olives. These changes are a substantial portion of the consumer price. To the extent that they increase, farm prices will be less favorable than would be indicated otherwise.

The tables and figures used in this circular are summaries of more detailed information appearing in "Mimeographed Report No. 227," published in December, 1959. This report gives sources in detail. It may be obtained by writing to the Giannini Foundation of Agricultural Economics at Davis or Berkeley.

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